



# *Technology for the Warfighter*

## *Defense Manufacturing Conference*

*November 27, 2001*

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# Quadrennial Defense Review (QDR)

## September 30, 2001

- Move From “Threat-Based” to “Capabilities-Based” Planning
- Key Military-Technical Trends of Adversaries
- Exploit R&D to Maintain Decisive lead in Technologies
- Develop & Exploit Technologies
- Reduce Cycle Time

*“Protecting the American Homeland From Attack is the Foremost Responsibility of the U.S. Armed Forces...”*

# Under Secretary of Defense (Acquisition, Technology & Logistics)



## Goals

- Achieve credibility and effectiveness in the acquisition and logistics support process
- Revitalize the quality and morale of the DoD Acquisition, Technology, and Logistics workforce
- Improve the health of the defense industrial base
- Rationalize the weapon systems and infrastructure with the defense strategy
- Initiate high leverage technologies to create the warfighting capabilities, systems, and strategies of the future

# Direction for Defense Research and Engineering

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- **Enable future DoD capabilities through an integrated technology program**
- **Accelerate technology transition to the warfighter**
- **Enhance near term technical support**
- **Revitalize the DoD laboratories**
- **Develop, attract and retain a quality national security technical workforce**



# Strategic Environment

## Global US Interests

*Political - Economic - Humanitarian*



## Globalization of Technology

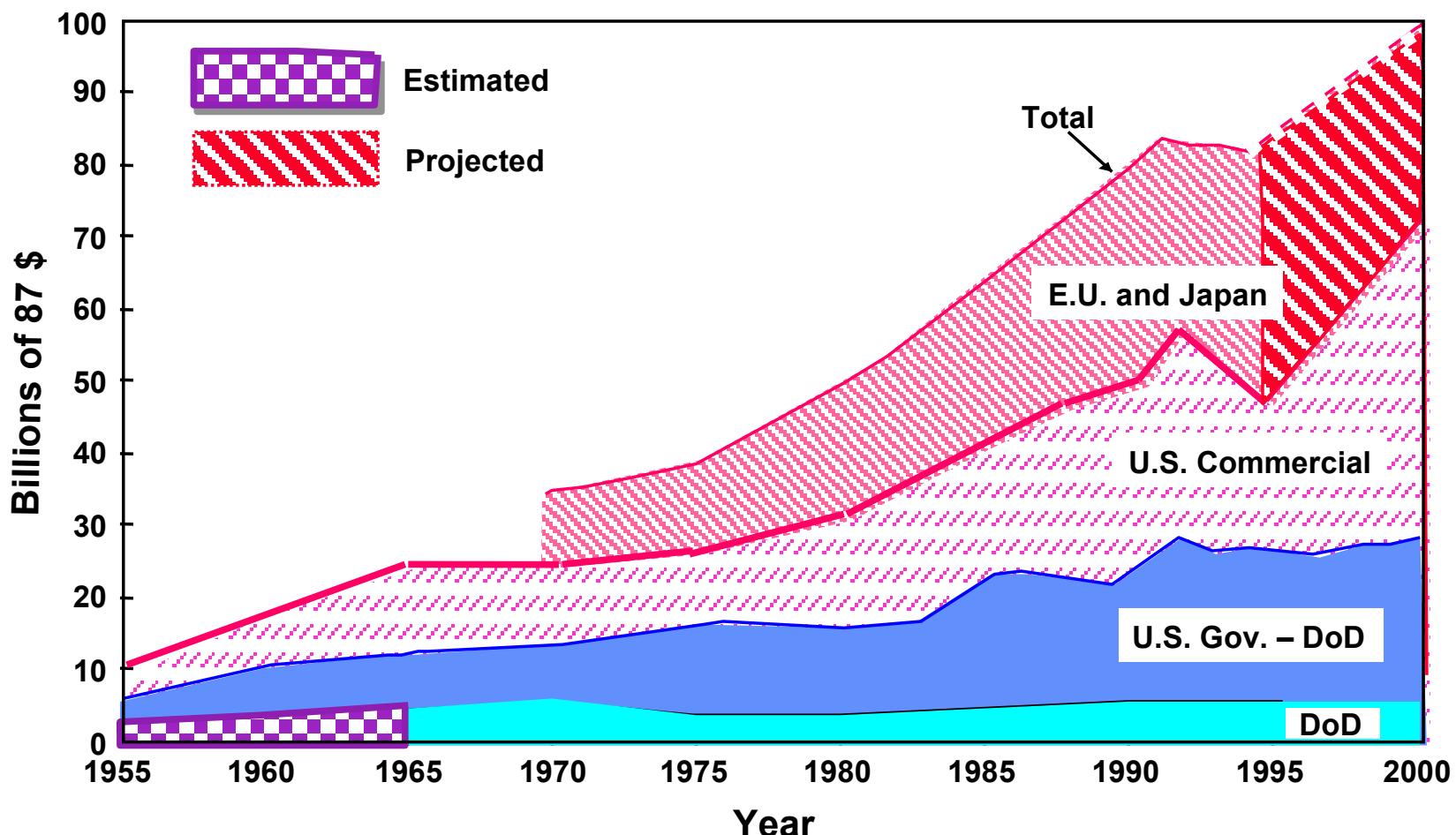


## Asymmetric Threats

*In any domain - Air, Land, Sea, Space or Information*



# U.S. and Worldwide Research Base since WWII



Source: Report of the Defense Science Board Task Force on the Technology Capabilities of Non-DoD Providers; June 2000; Data provided by the Organization for Economic Cooperation and Development & National Science Foundation



# FY02 RDT&E Budget Request

FY02 RDT&E = \$47.2B  
requested  
(6.1 thru 6.7)

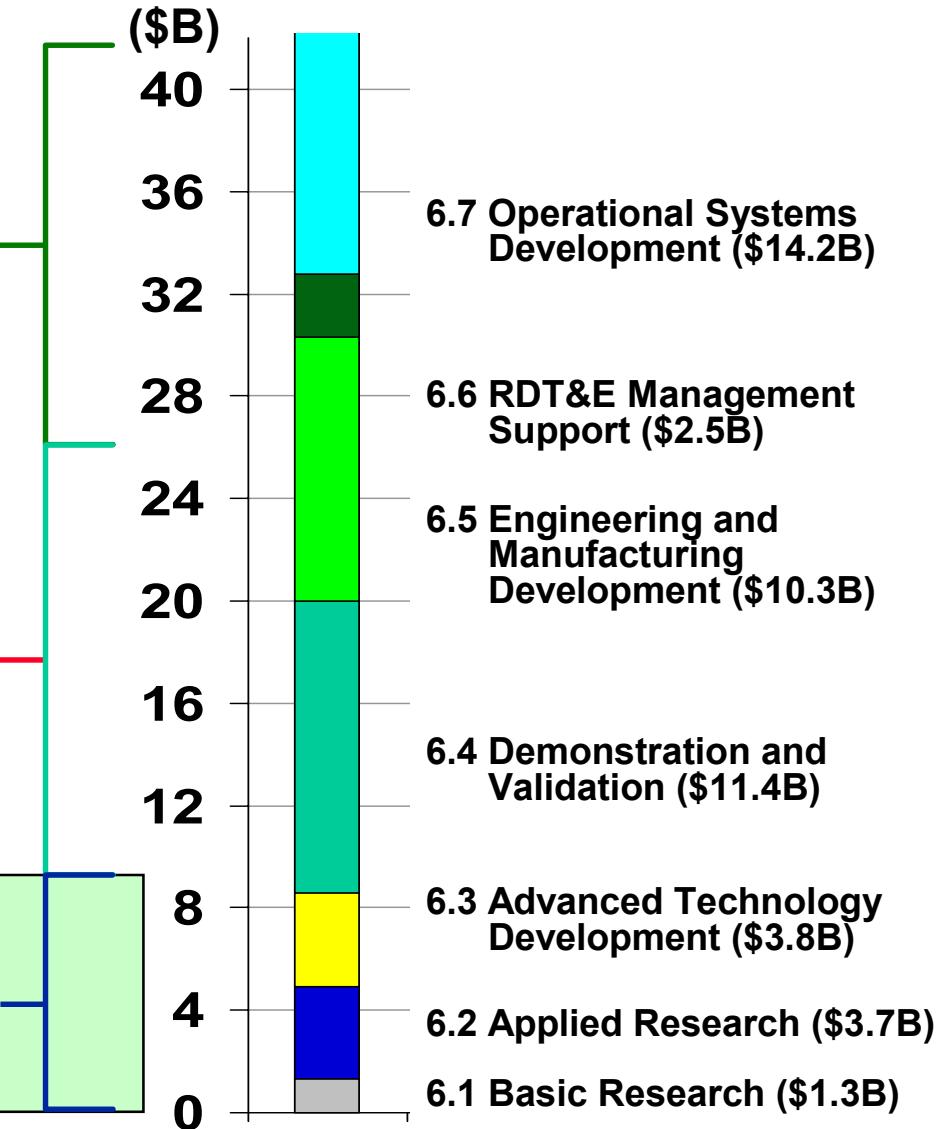
(6.6 + 6.7 = \$16.7B)

Development  
(6.4 + 6.5 = \$21.6B)

Technology Base  
(6.1 + 6.2 = \$4.9B)

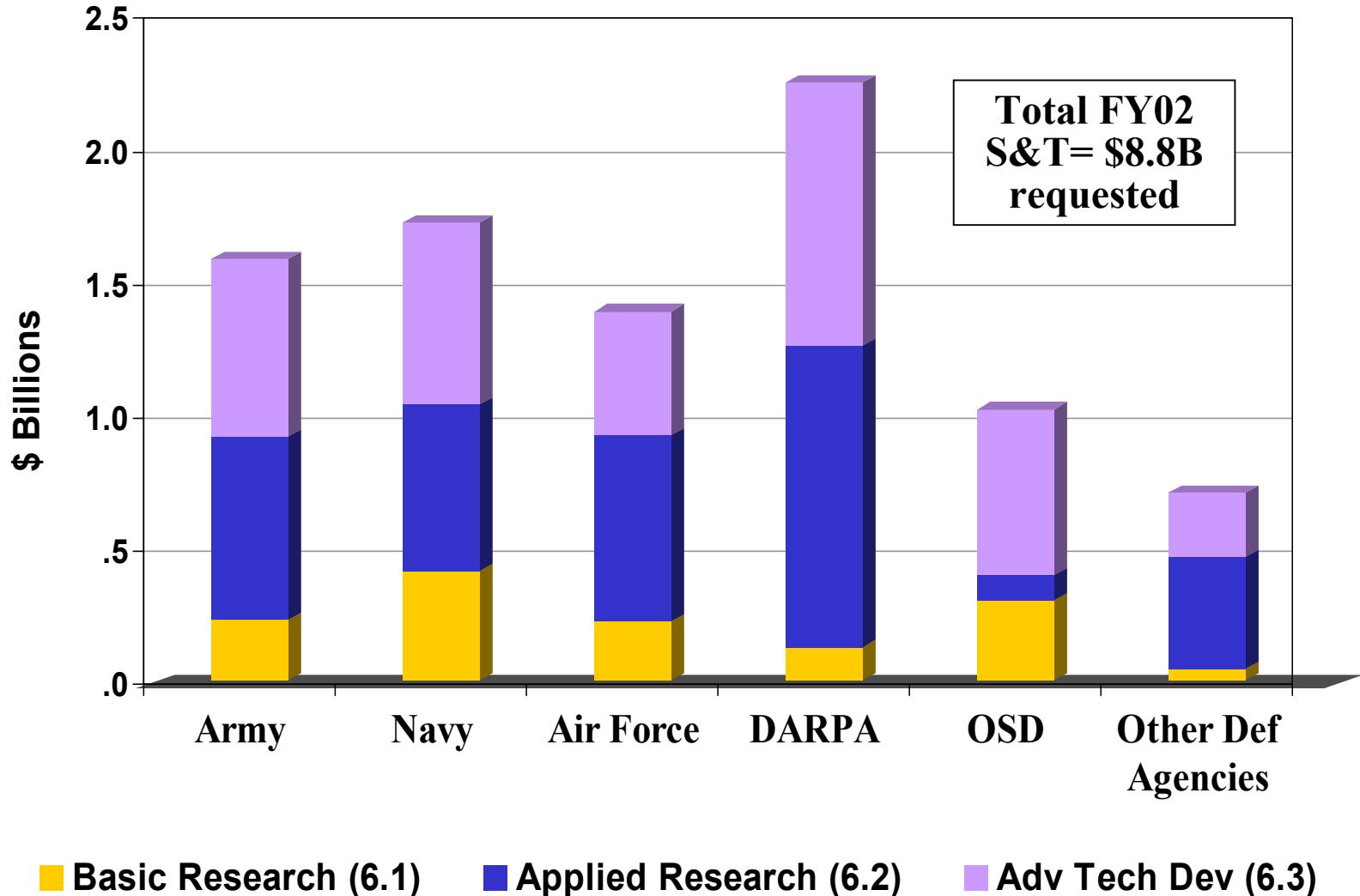
Science and Technology  
(6.1 + 6.2 + 6.3 = \$8.8B)

19% of RDT&E





# FY02 Budget Request DoD S&T





# Science & Technology Priorities

## *Technical*

- Basic Research
- JV 2020 Capabilities
  - Chemical & Biological Defense
  - Information Assurance
  - Hardened & Deeply Buried Targets
  - Smart Sensor Web
  - Cognitive Readiness
- Revolutionary Capabilities
  - High Energy Laser
  - Electric Drive
  - Autonomous Systems
- Enabling Capabilities
  - Propulsion
  - Software Intensive Systems
  - High Performance Computing
  - Modeling & Simulation

## *Non-Technical*

- Funding Stability
- S&T Workforce
- Technology Transition
  - Technology Readiness Assessments
  - Technology Readiness Levels



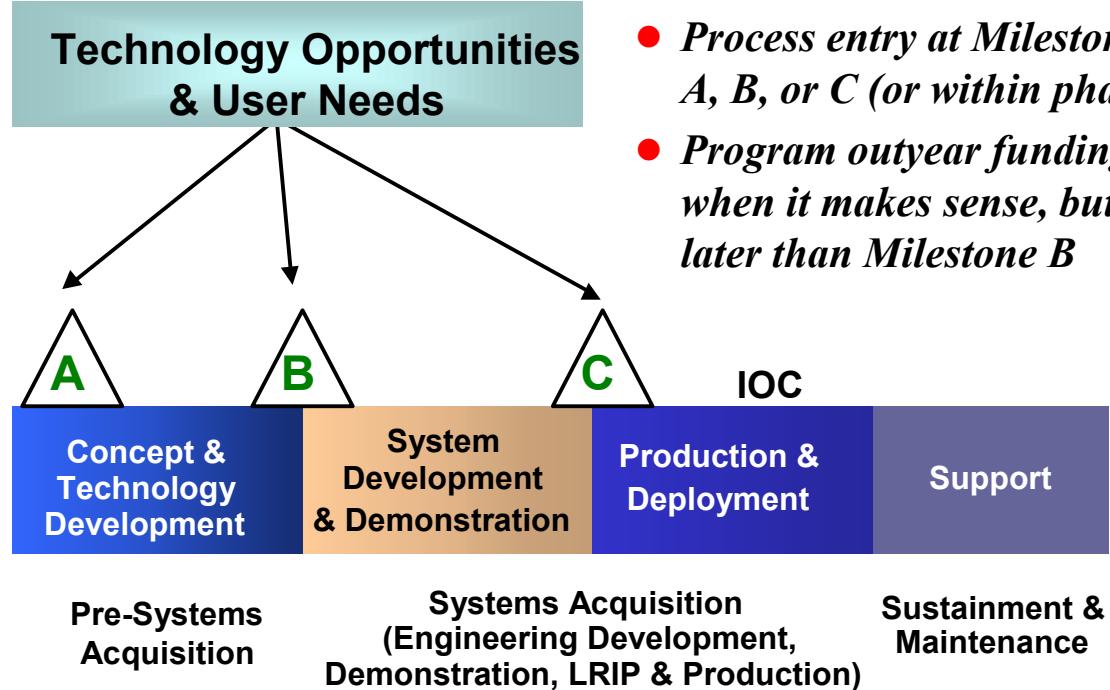
# DoD 5000-Series

## S&T Role in Evolutionary Acquisition



- **DoDD 5000.1**
  - Rapid Transition From S&T to Products
  - Emphasis on Affordability
- **DoDI 5000.2**
  - Focus on S&T Solutions in Pre-Acquisition
  - Use Mechanisms with User & Acquisition Customer to Ensure Transition
- **DoD 5000.2-R**
  - Conduct Technology Readiness Assessment for Critical Technologies

### Defense Acquisition Management Framework



Documents Available At  
<http://www.acq.osd.mil/ara/>

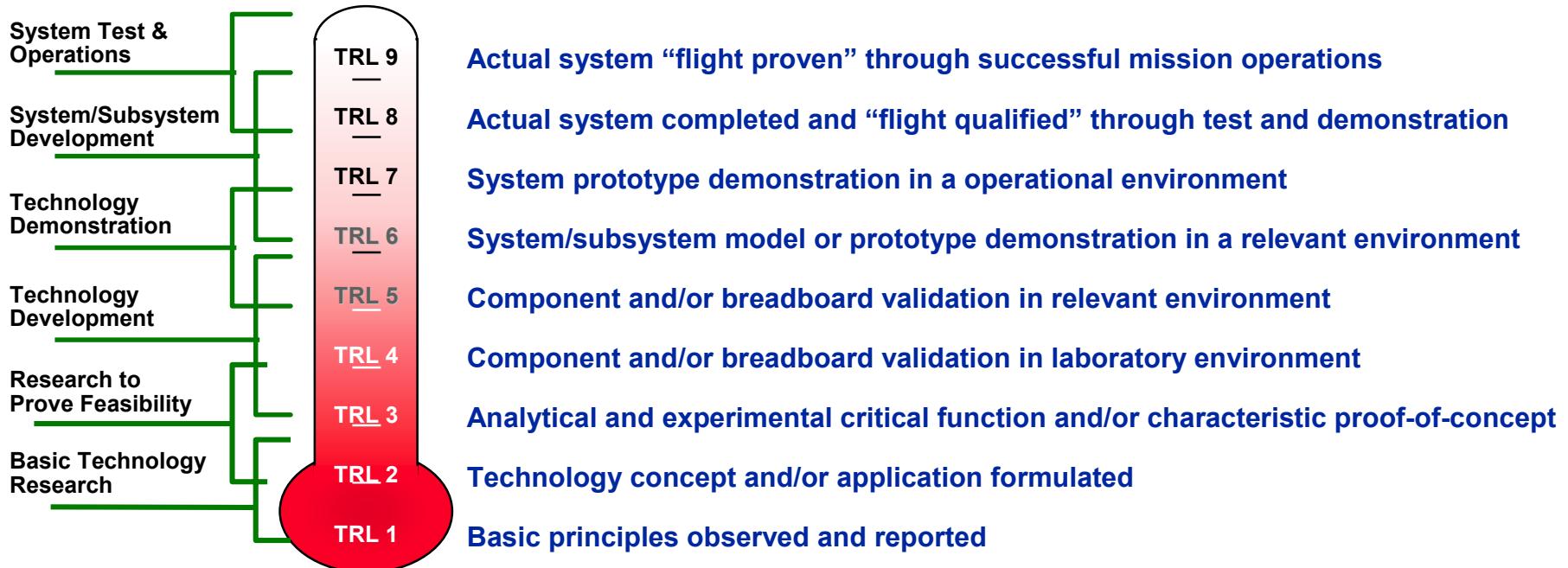
# DoD 5000.2-R

## Assess Technology Maturity



- Technology Readiness Assessments (TRAs) for Critical Technologies
  - Use Technology Readiness Levels (TRLs), or Some Equivalent
- TRAs Conducted by the Services & Agencies (Except Joint Programs)
- Assessments Evaluated by the Dep Under Sec of Defense (S&T)
- **Findings Forwarded to the Overarching IPT and Defense Acq. Board**

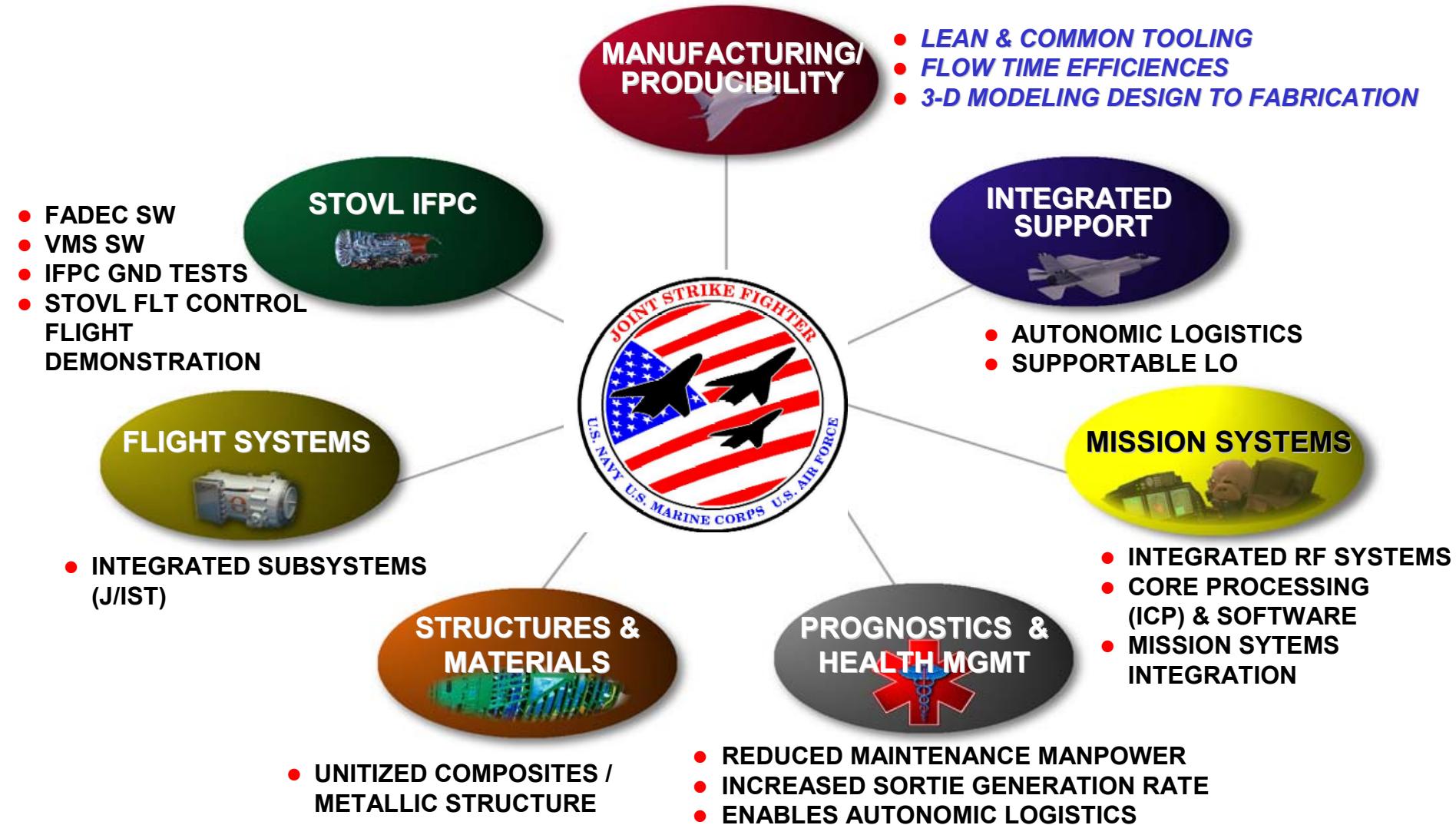
### Technology Readiness Levels (TRLs)



# Technology Readiness Assessment (TRA)

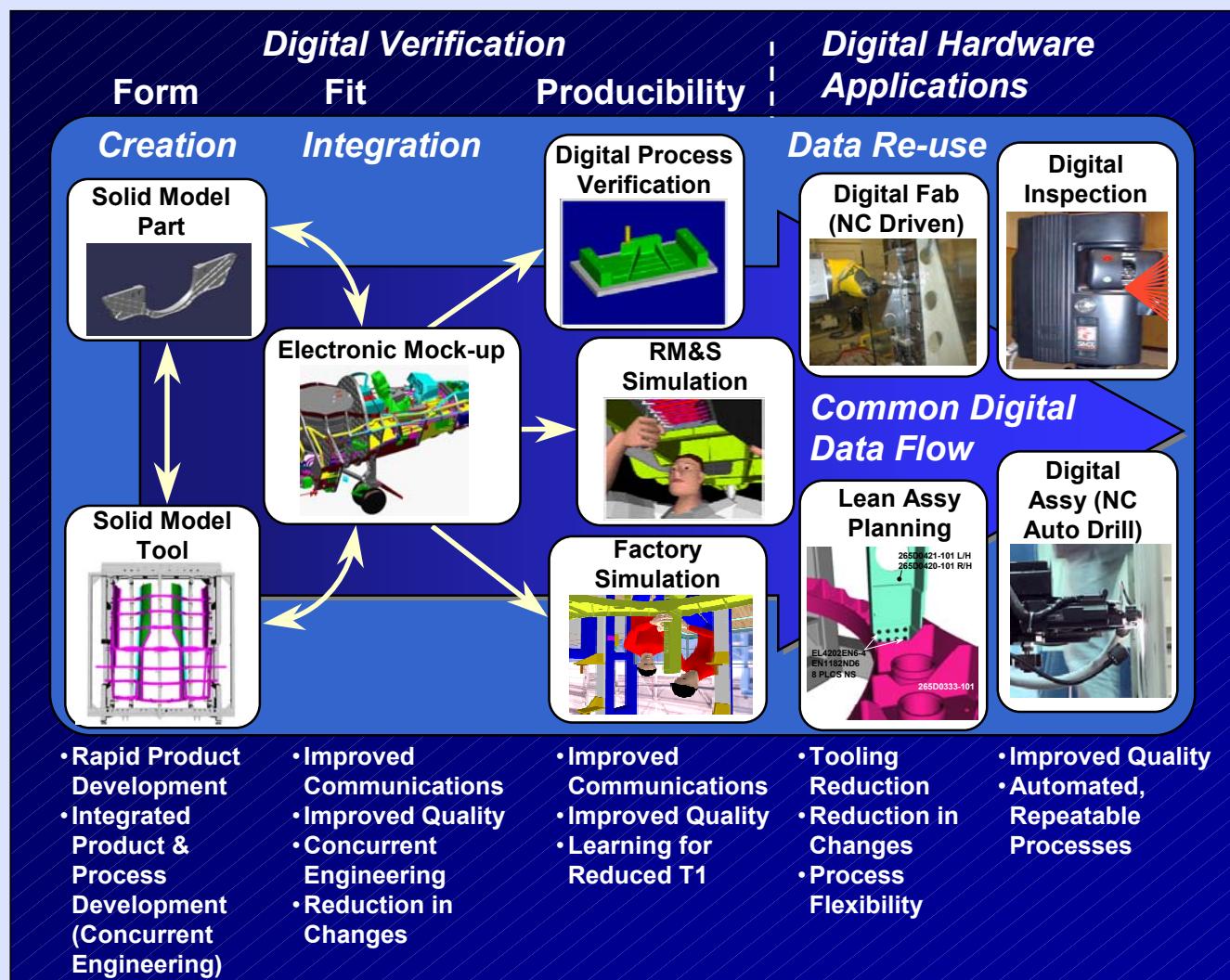


## Example: Joint Strike Fighter (JSF)



# JSF Digitally Driven Product Design & Manufacture

- **Solid Model Data**
  - NC Ready Models
  - Reduced Span Time
- **Data Re-Use**
  - Eliminates Interpretation Error
  - Reduce Task Span Times
- **Digital Product/Process Verification**
  - Form, Fit, & Producibility Verified Prior to Assembly
  - Improved Quality
  - Reduced Cost and Reduced Risk



*Digital Data Data Re-use Eliminates Errors, Drives Down Cost*



# Air Force Manufacturing Technology (ManTech) Program: F-22 Impact

## Integrally Bladed Rotors (IBR)

- Reduced Part Count From 87 to 1
- Reduced Weight 54lbs



## Laser Shock Peening

- Reduced Cost \$10K / Blade
- Increased Throughput 6X

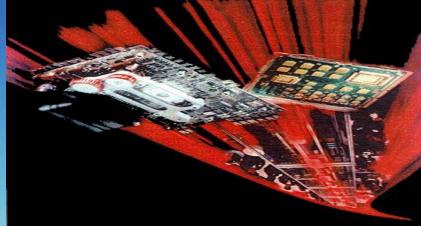


## Other ManTech Initiatives

- Lean Manufacturing
- Digital Product Models
- Ultra-thin Castings

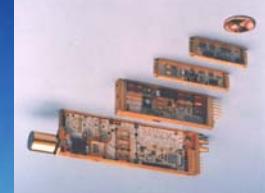
## Comm/Nav Modules

- Potential \$120M Cost Avoidance



## T/R Modules

- Reduced Cost 90%



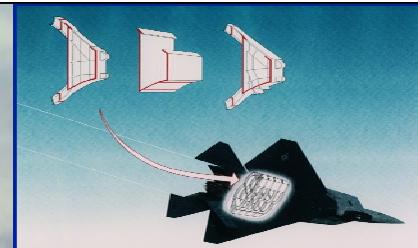
## Subarray Interconnects

- \$80M Cost Avoidance



## Welded Titanium Structure

- Potential \$100M Cost Avoidance



## Multi-Function Radome

- \$50M Cost Avoidance
- Reduced Cycle Time 50%





Winner:  
2001  
Defense  
ManTech  
Achievement  
Award

# Army ManTech

## Enhanced Manufacturing Processes for Body Armor Materials



### Plate Forming: Siliconized Silicon Carbide



### Plate Forming: Boron Carbide



- **Objective:** Develop & Implement Economical Production of Ceramic / Composite Small Arms Protective Plates for Personnel Protection

- **Participants:**

- Army Natick Soldier Center
- PM, Soldier Systems
- Marine Corps
- Simula Safety Systems Inc.
- CERCOM Inc.



Interceptor Body  
Armor Jacket

- **Benefits:**

- Stops Rifle / Machine Gun Fire
- 55% Lighter, 60% Lower Cost Compared to Armor Plates
- Cost Avoidance (NPV): \$193M

- **Implementation:**

- Over 50K Plates Delivered & Fielded; 140K Plates on Contract
- Supports “Operation Enduring Freedom”



# Bottom Line: Warfighter Capability



*Right Materiel, Right Place,  
Right Time, at the Right Cost -*  
***All The Time***



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# BACKUPS

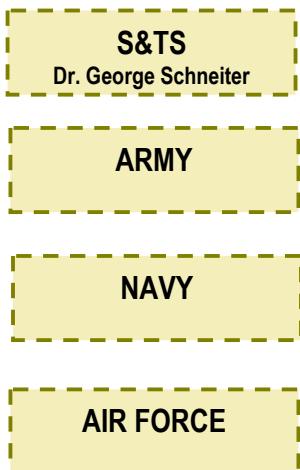
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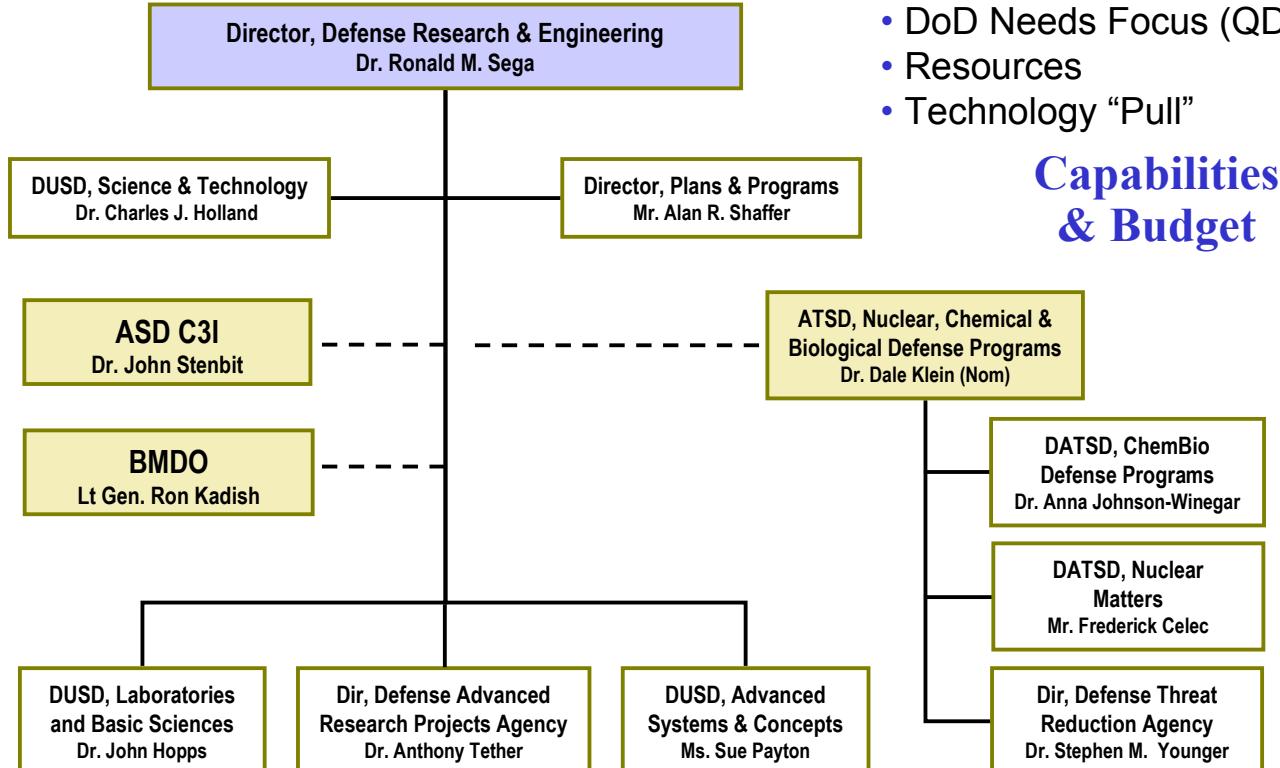
# DDR&E Organization

**Technology Areas**

- Planning
- Oversight
- Review Programs across Services and Agencies
- Technology “Push”



## Integrated Approach to Technology in DoD CTO



- DoD Needs Focus (QDR)
- Resources
- Technology “Pull”

## Capabilities & Budget

**Projects and Systems**

- Efficient Technology Transition
- Synergy and Integration of S&T Efforts
- Mutual Support for Programs within DoD (and outside of DoD as appropriate)



# Navy ManTech Impact on V-22

ManTech Project	Benefit
Heat Treatment for High-Performance Transmissions	Increased Power Density and Loss of Lube Tolerance
Thermoplastic Bearing Cages	Reduced Weight by 60%
T406 Engine Vane Actuators Powder Injection Molding	Life-cycle Cost Avoidance up to \$1.5M
Resin Impregnated Honeycomb Core Structures	Excellent Impact Resistance and Lighter Structure
Fiber Steering for Lightweight Composites	Improved Structural Efficiency
Gear Metrology & Performance Prediction	Reduced Vibration and Gear Wear
Hi-Speed Gear Inspection	Reduced Gear Inspection Time
Non-Contact Work Piece Positioning	Enhanced Precision Machining
Powder Metal Processing of T406 Turbine Disks	Life-cycle Cost Avoidance up to \$19M
In-Situ Composites Fiber Placement	20% Reduction in Fabrication Costs
Smart Sensors/Actuators	Increased Operational Capabilities
Ausform Finished Gears	Increased Gear Durability
Superalloy Casting Technology:	Reduced Manufacturing Costs

***Life-Cycle Cost Avoidance  
Exceeds \$45M***



## Payoff

- Weight Reduction
- Increased Maintenance Cycle Time
- Improved Performance